Collective motion in animal populations

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There is a long history of research on the mathematical modeling of animal populations, largely built on diffusion models. The classical literature, however, is inadequate to explain observed spatial patterning, or foraging and anti-predator behavior, because animals actively aggregate. This lecture will discuss models of animal aggregation, and the role of leadership in collective motion. It will also explore models of the evolution of collective behavior, and implications for the optimal design of robotic networks of interacting sensors, with particular application to marine systems.